links can be connected to each other; and

(c) configuring each of said nodes which is not a primary node so that a channel c on one of its incident links can be connected to the same channel c on its other incident link.

2. In a ring communications network having a plurality of channels on each of a plurality of links interconnecting nodes of said network, with one of said nodes being a primary node which is configured so that any two channels between its incident links can be connected to each other, wherein said channels of said links are assigned to a set of end-to-end communication connections 1, ..., j, ..., m, where each end-to-end communication connection j is a sequence of connected channels that follow a path p_j on said ring communications network, a method of assigning channels to said paths $\{p_1, ..., p_m\}$ comprising:

(a) identifying each path p_i as a cut path if it passes through said primary node and as an uncut path if it does not pass through said primary node;

(b) for each cut path p_i, forming two paths a_i and b_i, to be referred to as residual paths, by splitting p_i into two at said primary node such that said primary node becomes an end node for both said residual paths;

(c) assigning a single channel $c(p_j)$ to each uncut path p_j, and assigning a single channel $c(a_i)$ and a single channel $c(b_i)$ to each residual path a_i and b_i, respectively, wherein each connection using one of said paths is assigned a channel on each link of its path where no two of said connections are assigned the same channel on the

~~same link;~~

(d) for each uncut path p_i, assigning to it said channel $c(p_i)$ of each link that it traverses; and

(e) for each cut path p_i, assigning to it the said channel $c(a_i)$ of each link that residual path a_i traverses, and assign it channel $c(b_i)$ of each link that residual path b_i traverses.

3. A ring communications network for providing high utilization of its bandwidth, said network comprising: a plurality of nodes connected to each other by a plurality of links, with one of said nodes being a primary node capable of connecting any two channels between its two incident links, of said links, and with each of the remaining ones of said nodes capable of connecting only the same channel to each other on its two incident links, of said links, wherein a circuit connection terminating at two of said nodes is established by assigning channels on those of said links that are used for a path of said connection.

4. In a communications ring network having a plurality of nodes interconnected to each other by a plurality of links, a method of assigning channels on each link, of said links, along paths of connections through said network, said method comprising:

(a) providing full channel connectivity between any two channels of the two incident links, of said links, of a primary node, of said nodes;

(b) for each of the remaining ones of said nodes, attaching only the same channels to each other on its incident links;

(c) for each of said connections, assigning a channel on each link of its path such that no two connections use the same channel on a common link, of said links;

(d) for each connections whose path does not pass through said primary node, assigning the same single channel in each of said links along its entire path;

(e) identifying all paths of said connections that pass through said primary node, where latter said paths are referred to as cut paths;

(f) for each cut path, forming two paths, referred to as residual paths, by splitting said each cut path at said primary node which becomes an end node for said two residual paths of said each cut path; and

(g) assigning a single channel to each one of said residual paths.

5. In a ring communications network having N nodes, wherein each link between nodes is a multichannel multiplexed link having W channels, denoted by channel numbers $\{0, 1, \ldots, W-1\}$, a method of configuring said nodes of said network, said method comprising:

(a) designating one of said nodes as a primary node and numbering said nodes $0, 1, \ldots, N-1$ starting from the primary node and proceeding in only one direction around said ring to an adjacent one of said nodes;

(b) for $i = 0, \ldots, N-1$, numbering the link between the pair of nodes i and $i+1 \bmod N$ with the number i;

(c) creating graph H which is composed of a set of vertices and a set of edges, that go between pairs of vertices, where the set of vertices includes:

i. a collection of W vertices $\{u_0, ..., u_{W-1}\}$ called the stage 0 vertices,

ii. a collection of W vertices $\{v_0, ..., v_{W-1}\}$ called the stage s vertices, where $s \leq N+1$, and

iii. for each $i = 1, 2, ..., s-1$, a collection of vertices $\{x_0(i),\ x_1(i),\ ...,\ x_{s_i-1}(i)\}$ called the stage i vertices, with s_i denoting the number of vertices in stage i, and

the set of edges includes:

i. for each $i = 1, ..., s-2$, a collection of W edges between stage i vertices and stage $i+1$ vertices,

ii. an edge from each vertex u_i in stage 0 to a vertex in stage 1, and

iii. an edge from a vertex in stage $s-1$ to each vertex v_i in stage s;

(d) defining any function $f(\cdot)$ as a permutation if it is defined for the values $\{0, 1, ..., W-1\}$ such that $(f(0), f(1), ..., f(W-1))$ are distinct values from the set $\{0, 1, ..., W-1\}$;

(e) said graph H having the property that for each permutation $\pi(\cdot)$, there is a permutation $\tau(\cdot)$ and a set of W paths $\{h_0,\ h_1,\ ...,\ h_{W-1}\}$ in H such that:

i. for each $i = 0, ..., W-1$, path h_i starts at node $u_{\tau(i)}$ in stage 0, traverses vertex stages $1, 2, ..., s$ in succession, and ends at node $v_{\tau(\pi(i))}$ in stage s, and

ii. the paths $\{h_0, ..., h_{W-1}\}$ do not have common edges in H;

the collection $(\tau(\cdot),\ h_0,\ h_1,\ ...,\ h_{W-1})$ being referred to as an interconnection instance for $\pi(\cdot)$;

(f) assigning each edge e of said graph H to a channel, denoted by $\gamma(e)$, in the said ring communications network comprising:

i. assigning the W edges between vertices of stages 0 and 1 in the said graph H to distinct channels in link 0 of the said ring communications network such that if edge e of H is incident to vertex u_i in stage 0, then e is assigned to channel i and $\gamma(e)$ equals i,

ii. assigning the W edges between vertices of stages $s-1$ and s in the said graph H to distinct channels in link $(s-1)$ mod N in the said ring communications network such that if edge e of H is incident to vertex v_i in stage s, then e is assigned to channel i and $\gamma(e)$ equals i, and

iii. for each stage $i = 1, 2, ..., s-2$, assigning the W edges between the vertices of stages i and $i+1$ in the graph H to distinct channels in link i of the said network, and for each of the said edges e of H, letting $\gamma(e)$ denote the channel of link i that e is assigned to;

(g) for $i = 1, 2, ..., s-1$, configuring node $i \bmod N$ of said ring communications network such that channel c on link $(i-1) \bmod N$ is attached to channel c' on link $i \bmod N$ if:

i. in the said graph H, there is an edge e between vertices of stages $i-1$ and i such that $\gamma(e) = c$,

ii. in the said graph H, there is an edge e' between vertices of stages i and $i+1$ such that $\gamma(e') = c'$, and

iii. in the said graph H, e and e' are incident to a common vertex in stage i; and

(h) configuring the other nodes such that a connection on any channel c on one of its links can be connected to the same channel c on its other link.

6. A method as recited in claim 5, further comprising a method of assigning channels to a set of end-to-end communication connections $1, ..., j, ..., m$, where each end-to-end communication connection j is a sequence of connected channels that follow a path p_j on the said ring communications network, whose nodes are configured as recited in claim 5, said method further comprising:

(a) identifying each path p_i as a cut path if it passes through said primary node and as an uncut path if it does not pass through said primary node;

(b) for each cut path p_i, forming two paths a_i and b_i, referred to residual paths, by splitting p_i into two at the primary node, such that the primary node becomes an end node for both residual paths, and then labeling the residual path that traverses link 0 by b_i and labeling the residual path that traverses link $N-1$ by a_i;

(c) partitioning the set of uncut and residual paths into W subsets denoted by $(P_0, ...P_{W-1})$, such that in each subset no two paths traverse a common link;

(d) finding a permutation $\pi(\cdot)$, as defined earlier in claim 5d, such that if p_j is a cut path, $a_j \in P_i$ and $b_j \in P_k$ then $\pi(i) = k$;

(e) for the permutation $\pi(\cdot)$, finding an interconnection instance $(\tau(\cdot)$, h_1, h_2, ..., $h_{W-1})$, as defined in claims 5e, where recall that $\tau(\cdot)$ is a permutation and $\{h_0, ..., h_{W-1}\}$ is a collection of paths in the said graph H of claim 5;

(f) for each uncut path p_i, assigning channels to it from each link it traverses such that:

i. if the path traverses a link j such that $j < s-1$ then a channel c of the link is assigned to the path, where c is determined by:

A. finding the value k such that $p_i \in P_k$,

B. in the said graph H, finding the edge e traversed by the path $h_{\tau(k)}$ between the stage j vertices and the stage $j+1$ vertices, and

C. letting c equal $\gamma(e)$,

ii. if the path traverses a link j such that $j \geq s-1$ then a channel c of the link is assigned to the path, where c is determined by:

A. finding the value k such that $p_i \in P_k$,

B. letting c equal $\tau(\pi(k))$; and

(g) for each cut path p_i, assigning channels to it from each link it traverses such that:

i. if the path traverses a link j such that $j < s-1$ and its residual path a_i (respectively, b_i) also traverses the link then a channel c of the link is assigned to the path p_i, where c is determined by

A. finding the value k such that $a_i \in P_k$ (respectively, $b_i \in P_k$),

B. in the said graph H, finding the edge e traversed by the path $h_{\tau(k)}$ between the stage j vertices and the stage $j+1$ vertices, and

C. letting c equal $\gamma(e)$,

ii. if the path traverses a link j such that $j \geq s-1$ and its residual path a_i

(respectively, b_i) also traverses the link then a channel c of the link is assigned to the path p_i, where c is determined by:

A. finding the value k such that $a_i \in P_k$ (respectively, $b_i \in P_k$),

B. letting c equal $\tau(\pi(k))$.

7. A method as recited in claim 5, wherein said graph H has the same topology as a $W \times W$ Benes network, which is composed of a set of vertices and a set of edges, that go between pairs of vertices, where

(a) the set of vertices includes:

i. a collection of W vertices $\{u_0, ..., u_{W-1}\}$ called the stage 0 vertices,

ii. a collection of W vertices $\{v_0, ..., v_{W-1}\}$ called the stage s vertices, where $s = 2n$ and $n = \log_2 W$,

iii. for each $i = 1, 2, ..., s-1$, a collection of $W/2$ vertices $\{x_0(i),\ x_1(i),\ ...,\ x_{W/2-1}(i)\}$ called the stage i vertices;

(b) and the set of edges includes:

i. a collection of W edges between the stage 0 vertices and stage 1 vertices such that there is an edge between stage 0 vertex u_i and stage 1 vertex $x_j(1)$ if $(d_{n-1}, ..., d_1) = (\delta_{n-2}, ..., \delta_0)$, where $(d_{n-1}, ..., d_0)$ is the n bit binary representation of i and $(\delta_{n-2}, ..., \delta_0)$ is the $n-1$ bit binary representation of j,

ii. a collection of W edges between the stage $s-1$ vertices and stage s vertices such that there is an edge between stage s vertex v_i and stage $s-1$ vertex

$x_j(s-1)$ if $(d_{n-1}, \ldots, d_1) = (\delta_{n-2}, \ldots, \delta_0)$, where $(d_{n-1}, \ldots, d_0)$ is the n bit binary representation of i and $(\delta_{n-2}, \ldots, \delta_0)$ is the $n-1$ bit binary representation of j,

iii. a collection of W edges between stage 1 vertices and stage 2 vertices such that there is an edge between stage 1 vertex $x_i(1)$ and stage 2 vertex $x_j(2)$ if $(d_{n-2}, \ldots, d_1) = (\delta_{n-3}, \ldots, \delta_0)$, where $(d_{n-2}, \ldots, d_0)$ is the $n-1$ bit binary representation of i and $(\delta_{n-2}, \ldots, \delta_0)$ is the $n-1$ bit binary representation of j,

iv. a collection of W edges between stage $n-1$ vertices and stage n vertices such that there is an edge between stage $n-1$ vertex $x_i(n-1)$ and stage n vertex $x_j(n)$ if $(d_{n-2}, \ldots, d_1) = (\delta_{n-2}, \ldots, \delta_1)$, where $(d_{n-2}, \ldots, d_0)$ is the $n-1$ bit binary representation of i and $(\delta_{n-2}, \ldots, \delta_0)$ is the $n-1$ bit binary representation of j,

v. for each $k = 2, 3, \ldots, n-2$, a collection of W edges between stage k vertices and stage $k+1$ vertices such that there is an edge between stage k vertex $x_i(k)$ and stage $k+1$ vertex $x_j(k+1)$ if $(d_{n-1-k}, \ldots, d_1) = (\delta_{n-k-2}, \ldots, \delta_0)$ and $(d_{n-2}, \ldots, d_{n-k}) = (\delta_{n-2}, \ldots, \delta_{n-k})$, where $(d_{n-2}, \ldots, d_0)$ is the $n-1$ bit binary representation of i and $(\delta_{n-2}, \ldots, \delta_0)$ is the $n-1$ bit binary representation of j,

vi. a collection of W edges between stage $s-2$ vertices and stage $s-1$ vertices such that there is an edge between stage $s-2$ vertex $x_i(s-2)$ and stage $s-1$ vertex $x_j(s-1)$ if $(d_{n-3}, \ldots, d_0) = (\delta_{n-2}, \ldots, \delta_1)$, where $(d_{n-2}, \ldots, d_0)$ is the

$n-1$ bit binary representation of i and $(\delta_{n-2}, ..., \delta_0)$ is the $n-1$ bit binary representation of j,

vii. a collection of W edges between stage n vertices and stage $n+1$ vertices such that there is an edge between stage n vertex $x_i(n)$ and stage $n+1$ vertex $x_j(n+1)$ if $(d_{n-2}, ..., d_1) = (\delta_{n-2}, ..., \delta_1)$, where $(d_{n-2}, ..., d_0)$ is the $n-1$ bit binary representation of i and $(\delta_{n-2}, ..., \delta_0)$ is the $n-1$ bit binary representation of j, and

viii. for each $k = n+1, n+2, ..., s-3$, a collection of W edges between stage k vertices and stage $k+1$ vertices such that there is an edge between stage k vertex $x_i(k)$ and stage $k+1$ vertex $x_j(k+1)$ if $(d_{k-1-n}, ..., d_0) = (\delta_{k-n}, ..., \delta_1)$, and $(d_{n-2}, ..., d_{k+1-n}) = (\delta_{n-2}, ..., \delta_{k+1-n})$, where $(d_{n-2}, ..., d_0)$ is the $n-1$ bit binary representation of i and $(\delta_{n-2}, ..., \delta_0)$ is the $n-1$ bit binary representation of j.

8. In a ring communications network having N nodes, wherein each link between each adjacent pair of said nodes is a multichannel multiplexed link, with W channels, denoted with channel numbers $\{0, ..., W-1\}$, a method of configuring each of said nodes of said network, said method comprising:

(a) designating one node in a ring as the primary node and numbering the nodes 0, 1, ..., N-1 starting from the primary node and proceeding in only one direction around said ring to an adjacent one of said nodes;

(b) for i = 0, ..., N-1, numbering the link between nodes i and (i+1)modN with the number i; and

(c) configuring each of said nodes such that channel c on link i may be connected to one of $\Delta+1$ channels on link $(i+1) \bmod N$, where $\Delta \geq 2$, and where one of the channels on link $(i+1) \bmod N$ is channel $\{(c+1) \bmod W$ and the other Δ channels on link $(i+1) \bmod N$ are the channels $\{(c - k \cdot \Delta^i) \bmod W : k = 0, 1, ..., \Delta - 1\}$.

9. A method as recited in claim 8 further comprising, a method of assigning channels to a set of end-to-end communication connections 1, ..., j, ..., m, where each end-to-end communication connection j is a sequence of connected channels that follow a path p_j on the said ring communications network as recited in claim 8, a method of assigning channels to the paths $\{p_1, ..., p_m\}$ further comprising:

(a) identifying each path p_j as a cut path if it passes through said primary node and as an uncut path if it does not pass through said primary node;

(b) for each cut path p_i, forming two paths a_i and b_i, referred to residual paths, by splitting p_i into two at the primary node, such that the primary node becomes an end node for both residual paths, and then labeling the residual path that traverses link 0 by b_i and labeling the residual path that traverses link $N-1$ by a_i;

(c) partitioning the set of uncut and residual paths into W subsets denoted by $(P_0, ...P_{W-1})$, such that in each subset no two paths traverse a common link;

(d) finding a permutation $\pi(\cdot)$, as defined in claim 5d such that if p_j is a cut path, $a_j \in P_i$ and $b_j \in P_k$ then $\pi(i) = k$;

(e) for the permutation $\pi(\cdot)$, defining a pair of channel numbers i and j to be π-

related if there is a sequence of channel numbers $(r_0, r_1, ..., r_k)$ such that $r_0 = i$, $r_k = j$, and for $n = 0, 1, ..., k-1$, $r_{n+1} = \pi(r_n)$;

(f) partitioning the channel numbers $\{0, ..., W-1\}$ into nonempty subsets $(C_0, ..., C_{M-1})$, where M is the number of subsets, such that numbers within a subset are π-related, while numbers from different subsets are not;

(g) finding the size of each subset C_i and denoting it by s_i;

(h) for each C_i, finding a function $q_i(\cdot)$ that is defined for the set of values $\{0, ..., s_i - 1\}$ and takes values from the set $\{0, ..., s_i - 1\}$ such that:

i. there is one element j in C_i such that $q_i(j) = 0$, and

ii. for each element j in C_i, $q_i(\pi(j)) = (q_i(j) + 1) \bmod s_i$;

(i) finding a set of numbers $\{t_0, ..., t_{M-1}\}$ from the set $\{0, ..., W-1\}$ such that for $i = 0, ..., M-1$, $t_{(i+1) \bmod M} = (t_i + s_i) \bmod W$;

(j) for each $k = 0, ..., M-1$:

i. letting $(d_{N-1}(k), d_{N-2}(k), ..., d_0(k))$ denote the base Δ, N digit representation of the value $s_k - 1$,

ii. letting $D_0(k)$ denote 0, and for $i = 1, 2, ..., N-1$, letting $D_i(k)$ denote $\sum_{n=0}^{i-1} d_n(k) \cdot \Delta^n$; and

(k) for each pair (i, j), where $j \in \{0, 1, ..., N-1\}$ is a link number and $i \in \{0, ..., W-1\}$, determining a value $\sigma(i, j)$ comprised:

i. let k denote the value such that $i \in C_k$,

ii. determine a value $\rho(i, j)$, where

A. if $q_k(i) = s_k - 1$ then let $\rho(i,j) = s_k - 1 - D_j(k)$

B. if $q_k(i) < s_k - 1$ and $q_k(i) < s_k - 1 - D_j(k)$ then let $\rho(i,j) = q_k(i)$,

C. if $q_k(i) < s_k - 1$ and $q_k(i) \geq s_k - 1 - D_j(k)$ then let $\rho(i,j) = q_k(i) + 1$,

iii. let $\sigma(i,j) = (t_k + \rho(i,j)) \bmod W$;

(l) for each uncut path p_k and each link j it traverses, assign channel $\sigma(i,j)$ from the link to the path, where i is such that $p_k \in P_i$; and

(m) for each residual path a_k (resp., b_k) and each link j it traverses, assign channel $\sigma(i,j)$ from the link to path p_k, where i is such that $a_k \in P_i$ (resp., $b_k \in P_i$).

10. A ring communications network having N nodes with multichannel communication links between each pair of said nodes, where each link has W channels, said ring network configured as follows:

each of said nodes configured such that channel C on link i may be connected to one of $\Delta + 1$ channels on link $(i+1) \bmod N$, where $\Delta \geq 2$ and where one of the channels on link $(i+1) \bmod N$ is channel $(c+1) \bmod W$ and the other Δ channels on link $(i+1) \bmod N$ are the channels $(c - k \cdot \Delta^i) \bmod W$, where $k = 0, 1, ..., \Delta - 1$, where the nodes are numbered from $0, 1, ..., N$ starting at the primary node of the ring and proceeding in one direction around said ring, and where a link between nodes i and $(i+1) \bmod N$ is designated as link i.

11. In a star network having a plurality of N nodes interconnected by a plurality of links, with one of said nodes being the *hub* node h and the other said nodes being $\{x_1, ..., X_{N-1}\}$, referred to as the *spoke nodes*, and being connected to said hub node

Sub B1

by one of said links having W channels, where W is even, a method of configuring said nodes, said method comprising:

(a) dividing channels into two sets, with each set having $W/2$ channels, where the first set has channels numbered $\{0, ..., W/2-1\}$ and the second set has channels numbered $\{W/2, ..., W-1\}$, and

(b) configuring said hub node such that channel i on any one of said links may be connected to channel $w(i)$ on any of said links, where $w(i)$ equals $i + W/2$.

12. A method as recited in claim 11, further comprising a method for assigning channels to a connection which traverses at most two of said links, wherein paths $p_1, ..., p_m$ traverse exactly two of said links and paths $p_{m+1}, ..., p_M$ traverse only one of said links, and wherein said links are designated as links $e_1, e_2, ..., e_{N-1}$ such that for $i = 1, ..., N-1$, e_i is between nodes x_i and h, comprising:

(a) referring to a path as being *incident* to its end nodes;

(b) *directing* paths $\{p_1, ..., p_m\}$ so that each path is viewed as going from one of its end nodes to the other and that each spoke node will have at most $W/2$ incident paths that are directed into it and at most $W/2$ incident paths that are directed out of it;

(c) referring to a node that has at least one incident undirected path as a *free* node;

(d) directing the said paths $\{p_1, ..., p_m\}$ by using the following procedure:

i. if each link has exactly W paths from the set $\{p_1, ..., p_M\}$ that traverse it then let $R = M$; otherwise, construct additional paths $p_{M+1}, p_{M+2}, ..., p_R$ in

the star network so that for each link, there are exactly W paths from the set $\{p_1, ..., p_R\}$ that traverse it,

ii. initially all paths $\{p_1, ..., p_R\}$ are considered *undirected*, and

iii. as long as there is a free node, do the following:

A. start from a free node, say x_i, and traverse an undirected incident path (from the set $\{p_1, ..., p_R\}$) to the other end node, and direct the path in the direction of the traversal,

B. starting from the other end node, traverse an undirected incident path (from the set $\{p_1, ..., p_R\}$) to the next end node, and direct the path in the direction of the traversal, and

C. keep traversing undirected paths (and directing the traversed paths) in this way until x_i is reached;

(e) creating a bipartite graph G which has two sets of vertices $\{u_1, ..., u_{N-1}\}$ and $\{v_1, ..., v_{N-1}\}$ and has edges $\{b_1, ..., b_m\}$ such that for $i = 1, ..., m$, b_i is between u_j and v_k if path p_i is directed so that it traverses link e_j and then e_k;

(f) assigning a number from said first set $\{0, ..., W/2 - 1\}$ to said edges of graph G such that at any vertex in graph G has all of its incident edges assigned to distinct number of said first set, and denoting said number assigned to each edge b_i by $q(b_i)$; and

(g) for $i = 1, ..., m$, assigning channels to p_i where

i. the channels are $q(b_i)$ from link e_j and $w(q(b_i))$ from link e_k where j and k are such that u_j and v_k are the end vertices of b_i, where $w(i) = i + W/2$, and

(h) for $i = 1, 2, ..., N-1$, assigning distinct channels to all paths from the set $\{p_{m+1}, ..., p_M\}$ that traverse the link e_i such that said channels are not already assigned to paths from $\{p_1, ..., p_m\}$.

13. In a star network having N nodes with one of said nodes a hub node, wherein each of the other of said nodes is connected to said hub node by a multichannel link having W channels, where W is an even integer, a star network configured as follows:

said hub node configured such that channel i on any one of said links may be connected to channel $w(i)$ on any other of said links, where $w(i) = (i + W/2)$.

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14. In a network consisting of N nodes and E links $e_1, e_2, ...e_E$, wherein each link between nodes is a multichannel multiplexed link, consisting of W channels $\{0, 1, ..., W-1\}$, where W is even, a method of configuring the nodes in the network, said method comprising:

(a) grouping channels into two sets, $\{0, ..., W/2-1\}$ and $\{W/2, ..., W-1\}$; and

(b) at each node, for $i = 0, 1, ..., W/2-1$, connecting channel i on one link to channel $w(i)$ on all the other links incident on that node, where $w(i) = i + W/2$.

15. A method as recited in claim 14, further comprising a method for assigning channels to connections $1, 2, ..., m$ using paths $p_1, ..., p_m$, wherein each of said paths traverses at most two of said links, where no two connections traversing the same one of said links are assigned to the same channel on said one link, said method comprising:

(a) creating an equivalent star network with $E+1$ nodes with the E nodes $e'_1, e'_2, ...e'_E$ corresponding to the edges in the original network and the remaining node h being

the hub node; and

(b) creating an equivalent set of connections in the said star network $p'_1, p'_2, ..., p'_m$ such that:

i. if connection p_i uses link e_j in the original network then connection p'_i uses the link between nodes e'_j and h in the said star network,

ii. if connection p_i uses links e_j and e_k in the original network then connection p'_i uses the following two links in the said star network: the link between nodes e'_j and h and the link between nodes e'_k and h,

iii. assigning channels to the p'_i according to the **method of claim 12**, and assigning the same set of channels to p_i as to p'_i, and

iv. assigning channels to the set of paths $p'_i, ..., p'_m$ such that for $i = 1, 2, ..., m$ if p'_i is assigned channel c on the link between nodes e'_j and h and is also assigned channel c' on the link between nodes h and e'_k in the said star network then c and c' are the channels assigned to path p_i for links e_j and e_k respectively.

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16. A network having N nodes and E links for interconnecting said nodes, where each link is a multichannel multiplexed link having W channels, where W is even, a network configured as follows:

each node, for $i = 0, 1...., W/2 - 1$, channel i on one incident link connected to channel $w(i)$ on all other incident links of said each node, where $w(i) = i + W/2$.

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